

LOCKING DEVICE FOR LATCH ASSEMBLY

Background of the Invention

Field of the Invention

The present invention relates to a latch assembly and, more particularly, to a locking device for a latch assembly. The present invention finds particular application as a locking device for a latch and door assembly on an electric arc engine welder and will be described with particular reference thereto. However, it is to be appreciated that the present invention may relate to other similar environments and applications.

Discussion of the Art

U.S. Patent No. 4,365,831 of Bourne, expressly incorporated herein by reference, discloses a latch assembly for use in applications where the latched surface is subjected to pressure and acceleration loading. In particular, the '831 latch assembly includes a latch that partially resists inadvertent opening of the latch due to pressure and/or acceleration loading while remaining easy to open when it is desirable to do so. It is known to employ the '831 latch assembly for use on electric arc engine welders.

One problem with the '831 latch assembly is that it can inadvertently open due to pressure and/or acceleration loading if either of these are applied in a specific location of the latch. Further, the '831 latch assembly does not prevent unauthorized or undesirable opening of the latch by individuals. Accordingly, there is a need for a latch assembly that includes a locking device and, in particular, a latch assembly with a lock device for use on an electric arc engine welder.

Summary of the Invention

The present invention provides a new and improved locking device for a latch assembly that overcomes the foregoing difficulties and others and provides the aforementioned and other advantageous features. More particularly, in accordance with one aspect of the invention, a door and latch assembly for use on an electric arc engine welder is provided. In accordance with this aspect of the invention, the door and latch

assembly includes a door mounted on an associated arc engine welder housing. The door is movable between a door open position wherein an associated opening on the associated housing is accessible and a door closed position wherein the door covers the associated opening. A latch is pivotally mounted on the door. The latch is movable
5 between a latch closed position wherein the latch locks the door in the door closed position and a latch open position wherein the door is movable toward the door open position. A locking device is on the door. The locking device locks the latch in the latch closed position when the locking device is enabled and allows the latch to move from the latch closed position toward the latch open position when the locking device is
10 disabled.

In accordance with another aspect of the present invention, a door and latch assembly for use on an electric arc engine welder is provided. More particularly, in accordance with this aspect of the invention, the door and latch assembly includes a door mounted on an associated arc engine welder housing. The door is movable
15 between a door open position wherein an associated opening on the associated housing is accessible in a door closed position wherein the door closes the associated opening. A latch is rotatably mounted on the door and includes a latch biasing member and a housing engagement portion. The latch biasing member urges the latch to rotate in a latch first direction. The housing engagement portion limits movement of the door
20 from the door closed position to the door open position.

A latch trigger is rotatably mounted on the door and includes a latch trigger biasing member and a door engaging portion. The latch trigger biasing member urges the latch trigger to rotate in a latch trigger first direction. The door engaging portion limits movement of the latch trigger in the latch trigger first direction. The latch trigger engages the latch and limits movement of the latch in the latch first direction. The latch
25 trigger is movable in a latch trigger second direction against the urging of the latch trigger biasing member when a sufficient force is applied to the latch trigger whereby the latch trigger disengages the latch and allows movement of the latch in the latch first direction. A locking device is connected to the door limiting movement of the latch in
30 the latch first direction. The locking device is capable of being disabled whereby the locking device allows movement of the latch in the latch first direction. When the

locking device is disabled and the latch trigger is disengaged from the latch, the latch biasing member moves the latch in the latch first direction such that the housing engagement portion allows movement of the door from the door closed position to the door open position.

5 In accordance with yet another aspect of the present invention, an electric arc engine welder is provided. More particularly, in accordance with this aspect of the invention, the electric arc engine welder includes a housing having a cavity therein. A housing opening is defined by the housing and connects to the cavity. A door is mounted to the housing adjacent the housing opening. The door is movable between a
10 door closed position wherein the door closes the housing opening and a door open position wherein the cavity is accessible through the opening. A latch is pivotally mounted on the door. The latch is movable between a latch closed position wherein the latch locks the door in the door closed position and a latch open position wherein the door is movable toward the door open position. A locking device is adjacent the latch.
15 The locking device locks the latch in the latch closed position when the locking device is enabled and allows the latch to move from the latch closed position toward the latch open position when the locking device is disabled.

In accordance with still another aspect of the present invention, a door and latch assembly is provided. More particularly, in accordance with this aspect of the invention,
20 the door and latch assembly includes a door operatively connected to a housing for providing access into the housing when the door is moved toward a door open position. The latch is pivotally mounted on the door. The latch is movable between a latch closed position and a latch open position. A latch trigger is pivotally mounted on the door. The latch trigger is movable between a latch trigger first position wherein the latch
25 trigger maintains the latch in the latch closed position and a latch trigger second position wherein the latch is allowed to move from the latch closed position to the latch open position. A locking device is adjacent the latch for obstructing movement of the latch when the locking device is enabled and preventing the latch from moving to the latch open position from the latch closed position.

30 In accordance with still yet another aspect of the present invention, a latch assembly is provided. More particularly, in accordance with this aspect of the invention,

the latch assembly includes a latch adapted for pivotal movement about a first pivot pin and includes a latch engagement portion. The latch is movable from a latch closed position to a latch open position. A latch trigger is adapted for pivotal movement about a second pivot pin and includes a latch trigger engagement portion for selectively engaging the latch engagement portion. The latch trigger is movable between a latch trigger first position wherein the latch trigger engagement portion engages the latch engagement portion and a latch trigger second position wherein the latch trigger engagement portion is disengaged from the latch engagement portion. The latch trigger urges the latch toward the latch closed position when the latch trigger engagement portion engages the latch engagement portion. A locking device is provided for selectively blocking movement of the latch from the latch closed position to the latch open position when the locking device is enabled.

Brief Description of the Drawings

The invention may take form in various components and arrangements of components and in various steps and arrangements of steps. The drawings are only for purposes of illustrating a preferred embodiment and are not to be construed as limiting the invention.

Figure 1 is a partial side elevational view of an electric arc engine welder having a latch assembly with a locking device in accordance with a preferred embodiment of the present invention.

Figure 2 is a partial perspective view of the electric arc engine welder of Figure 1.

Figure 3 is a partial top plan view of the electric arc engine welder of Figure 1.

Figure 4 is a partial cross-sectional view of the electric arc engine welder taken along the line 4-4 of Figure 3.

Figure 5 is a partial cross-sectional view of the electric arc engine welder of Figure 1 showing the locking device in a nonobstructing position and a latch of the latch assembly in an open position.

Figure 6 is a partial cross-sectional view of the electric arc engine welder of Figure 1 showing the locking device in an obstructing position wherein the latch is prevented from moving toward its open position.

Detail d Description of the Preferr d Embodiment

Referring now to the drawings wherein the showings are for purposes of illustrating the preferred embodiment of the invention only and not for purposes of limiting the same, Figure 1 shows an electric arc welder engine generally designated by reference numeral 10. The welder engine 10 includes a housing 12 having a cavity therein for operatively receiving components of engine are welder (not shown). The housing 12 defines a housing opening 14 connected to the cavity for providing access thereto. A door or cover 16 is pivotally mounted to the housing 12 adjacent the opening 14 for selectively providing access into the housing 12 for one or more of the components of the engine welder 10 contained therein. For example, the door 16 could be mounted to the housing 12 adjacent a radiator of the engine welder 10 for providing access to the radiator when maintenance, repair or replacement of the radiator is necessary.

With additional reference to Figure 2, the door 16 is shown in a door closed position wherein the door rests against a flange member 18 of the housing 12 and the opening 14 is closed or covered. In this position, an outer surface 20 of the door 16 is contiguous with an outer surface 22 of the housing 12. The door 16 is movable to a door open position whereby access is provided into the housing 12 to the cavity. A latch assembly includes a latch 24 that is pivotally mounted to the door 16 and serves as a graspable structure for moving the door between the door closed and door open positions. As will be described in more detail below, the latch assembly resists inadvertent opening of the door due to pressure and/or acceleration loading while remaining relatively easy to open when it is desirable to do so.

The latch assembly further includes a latch trigger 26 pivotally mounted on the door 16. More specifically, both the latch 24 and the latch trigger 26 are received in an opening 28 defined in the door 16. With additional reference to Figures 3 and 4, the latch assembly further includes a latch assembly housing 30 (Figure 3) that rotatably supports the latch 24 and the latch trigger 26. The latch assembly housing 30 is mounted or secured to the door 16 by a plurality of fasteners such as bolts 32. Of course, any other fastener or connection could be used to attach the latch assembly

housing 30 to the door 16 including, without limitation, a weld connection, an adhesive connection, rivets, etc.

5 The latch assembly housing 30 supports a first pivot pin 34 in fixed relation relative to the door 16. The latch 24 is pivotally mounted for rotation about the first pivot pin 34. The latch 24 is movable between a first, latch closed position (shown in Figure 4) and a second, latch open position (shown in Figure 5). A first biasing member such as latch spring 36 urges the latch 24 in a first latch direction (counterclockwise in Figures 4-6) toward the latch open position. In the preferred embodiment the spring 36 is a torsion spring mounted about the first pivot pin 34. The latch assembly housing 30
10 further supports a second pivot pin 38 in fixed relation relative to the door 16. The latch trigger 26 is pivotally mounted for rotation about the second pivot pin 38. The latch trigger 26 is movable between a first, latch trigger closed position (shown in Figure 4) and a second, latch trigger open position (shown in Figure 6). A second biasing member such as latch trigger spring 40 urges the latch trigger 26 in a first latch trigger
15 direction (counterclockwise in Figures 4-6) toward the second, latch trigger open position. Like the spring 36, the spring 40 is a torsion spring and is mounted about the second pivot pin 38.

The latch 24 includes a first shoulder portion 42, also referred to herein as a housing engagement portion, that is adjacent the flange member 18 of the housing 12
20 when the latch is in the latch closed position to prevent the door 16 from opening. More particularly, the shoulder portion 42 is positioned adjacent an interior side 44 of the flange member 18. With the latch 24 in the latch closed position, the shoulder portion 42 is prevented or obstructed from passing the flange member 18 which is necessary to pivotally move or open the door 16. Thus, when the latch 24 is in the latch closed
25 position, it locks the door in a door closed position. When the latch is in the latch open position, the shoulder portion 42 moves away from the flange member 18 which allows the door 16 to be moved toward or to a door open position.

With reference back to Figure 2, the latch assembly further includes a locking device 50 adjacent the latch 24. The locking device 50 includes an attaching structure
30 such as a flange or tab 52 extending upwardly from the door 16 at a location generally adjacent the opening 28 and having a throughhole 54. The locking device 50 further

includes a lock 56 releasably secured to the attaching structure 52. More particularly, the lock 56 is insertable into the throughhole 54 of the tab 52. In the preferred embodiment, the lock 56 is a conventional key-type padlock having an arm 58 receivable in the throughhole 54. When the arm 58 is received in the throughhole 54 and, optionally, the lock 56 is locked, the locking device 50 is enabled. When the arm 58 and the lock 56 are removed from the throughhole 54, the locking device is disabled.

With additional reference to Figures 4-6, when the locking device 50 is enabled, the locking device 50 locks the latch 24 in the latch closed position, i.e., the latch is limited or prevented from moving to the latch open position. More particularly, the lock 56 obstructs movement of the latch 24 and does not allow the latch 24 to move from the latch closed position to the latch open position. As already described, when the latch 24 is in the latched closed position, the door is prevented from opening. Thus, when the locking device 50 locks the latch 24 in the latch closed position, the locking device 50 also prevents the door 16 from being opened. When the locking device 50 is disabled, the latch 24 is allowed, or at least not prevented by the lock 56, from moving from the latch closed position to the latch open position.

The latch 24 further includes a second shoulder portion 60 that engages or abuts a lower side 62 of the latch trigger 26 when the latch is in the latch closed position and the latch trigger 26 is in the latch trigger first position. Through the engagement between second shoulder portion 60 and the lower side 62 of the latch trigger 26, the latch trigger 26 maintains the latch 24 in the latch closed position. When the latch trigger 26 is moved to the second latch trigger position, the shoulder portion 60 no longer engages the lower side 62 of the latch trigger and, thus, the latch is allowed, at least by the latch trigger, to move from the latch closed position to the latch open position.

More particularly, the spring 36 urges the latch 24 to rotate (counterclockwise in Figures 4-6) about the first pivot pin 34 which causes the shoulder portion 60 to exert a force against the underside 62 of the latch trigger 26. Concurrently, the spring 40 urges the latch trigger 26 to rotate (counterclockwise in Figures 4-6) about the second pivot pin 38 which causes the underside 62 to exert a force against the shoulder portion 60 of the latch 24. The force exerted by the underside 62 is generally greater than the force

exerted by the shoulder portion 60 which prevents the latch 24 from moving toward its open position. The latch trigger 26 includes a flange portion 64, also referred to herein as a door engaging portion, that is urged against the door 16 by the spring 40. The flange portion 64 prevents the latch trigger 26 from moving the latch 24 beyond the position shown in Figure 4.

To open the latch assembly, with reference to Figure 6, an external force F is applied to an upper surface 66 of the latch trigger 26 that is sufficient to overcome the urging of the spring 40. The external force F rotates the latch trigger 26 about the second pivot pin 38 (clockwise in Figure 3) causing the underside 62 of the latch trigger 26 to disengage the shoulder portion 60 of the latch 24. With reference to Figure 5, with the latch trigger 26 disengaged from the latch 24, the latch is able to be urged by the spring 36 toward its second, open position (in the direction of arrow A in Figure 5).

In the second, open position, the latch 24 is graspable for pulling the door 16 toward its open position (in the direction of arrow B in Figure 5). When the force F is no longer applied to the latch trigger 26, it returns to its first, closed position wherein the flange portion 64 again rests against the door 16. To close the latch 24, the force F is again applied to the latch trigger 26 to allow the shoulder portion 60 space for clearance and a force is applied to the latch 24 to overcome the urging of the spring 36. The latch 24 is returned to its closed position and the force F is released from the latch trigger 26.

With reference to Figure 3, when the lock 56 is received in the throughhole 54, the padlock 56 serves as an obstruction to the latch 24. More particularly, at least a portion of the padlock 56 is locked in close proximity to the latch 24. With additional reference to Figure 6, the padlock 56, when connected to the tab 52, prevents the latch 24 from moving into its second, open position. Thus, the shoulder portion 42 remains generally adjacent the housing flange member 18 and, together with the portion of the door adjacent the flange member, prevents the door 16 from being moved to its open position. Thus, the lock serves as an obstruction to the latch 24 and thereby prevents the latch 24 from being moved into the latch open position. To open the door 16, the lock 56 must first be disabled or disengaged so that it is no longer obstructing the latch 24. Of course, it is to be understood that the lock of the present invention could be alternatively configured and still would be within the scope of the present invention.

In the preferred embodiment, the tab 52 is formed integrally with the door 16. More particularly, when the opening 28 is cut or lanced into the door 16, the tab 52 can be created by leaving a portion of the door 16 in the area of the opening 28 and bending or folding said portion of the door 16 to form the tab 52.

- 5 The invention has been described with reference to the preferred embodiment. Obviously, modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is intended that the invention be construed as including all such modifications and alterations insofar as they are within the scope of the appended claims and the equivalents thereof.